

U.S.

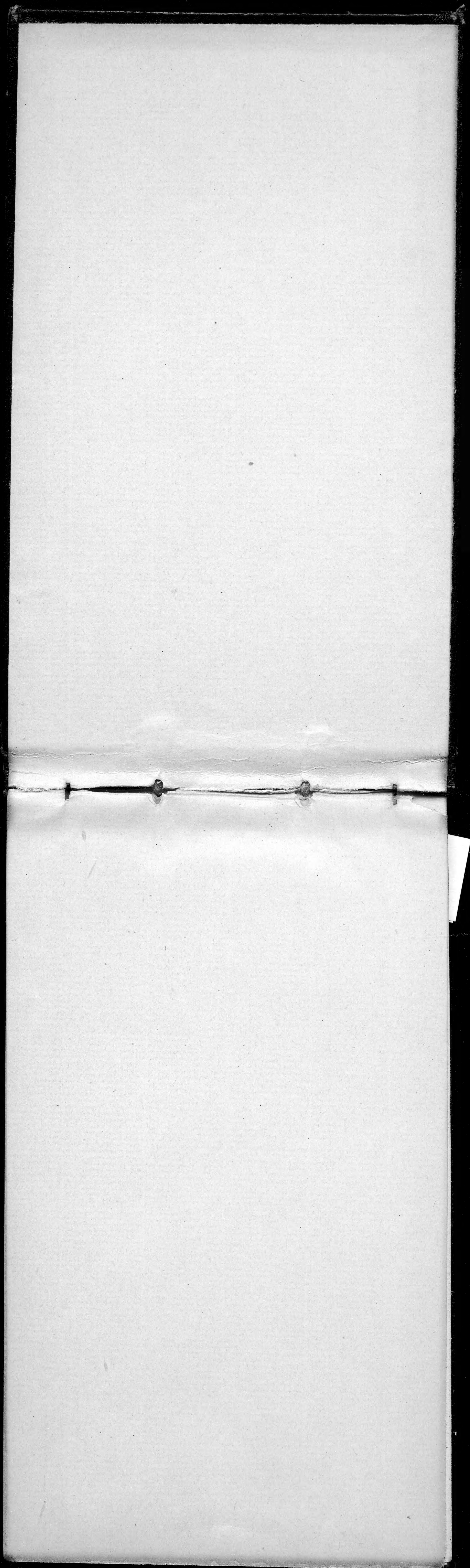
Hall

1890. 1

Astoria, Eugene, Or.  
Cal. gravels, Valley  
of Cal. Livermore

SURVEY.







10  
1890.

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Astoria

Eugene

Pat Orford

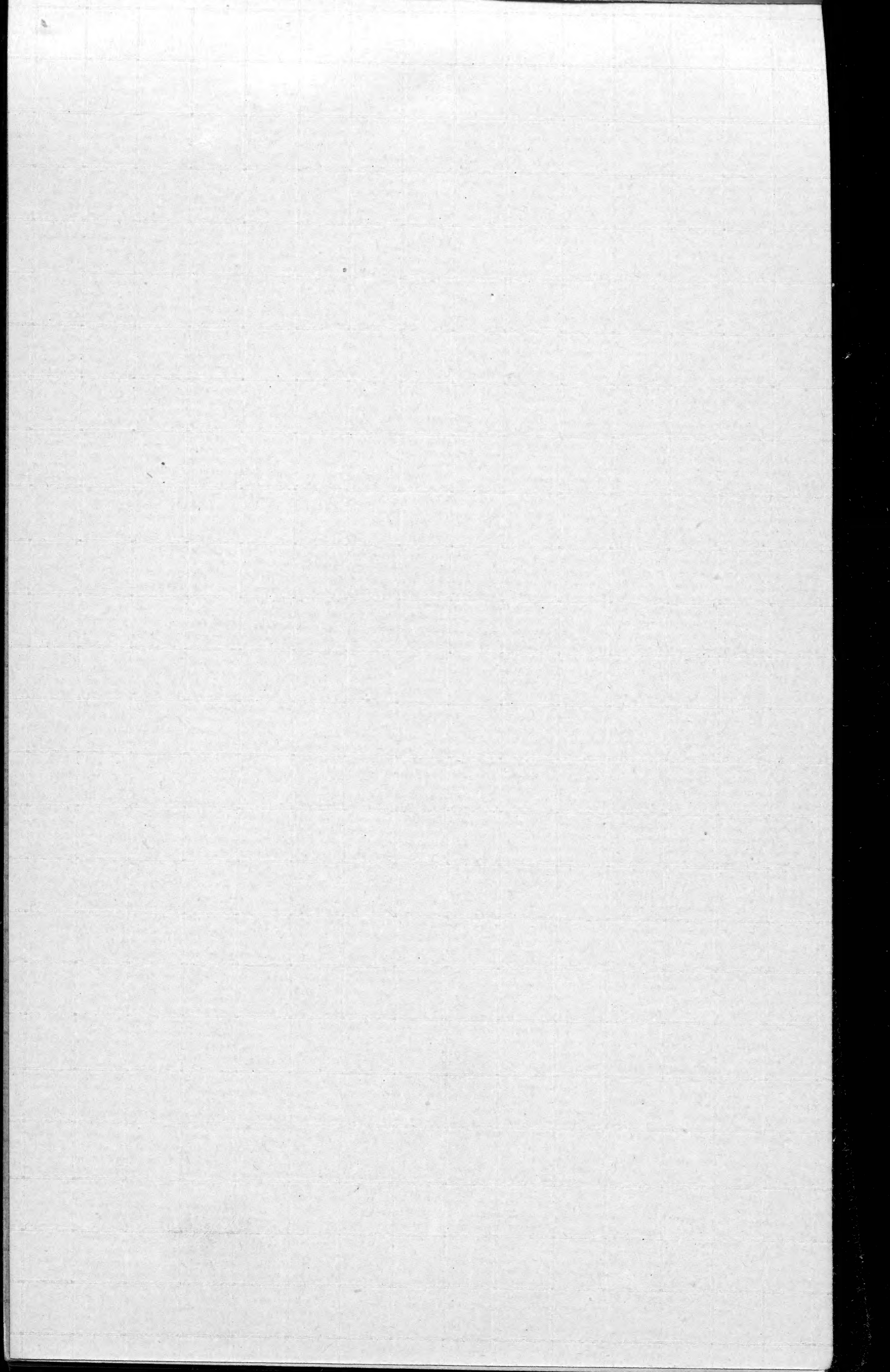
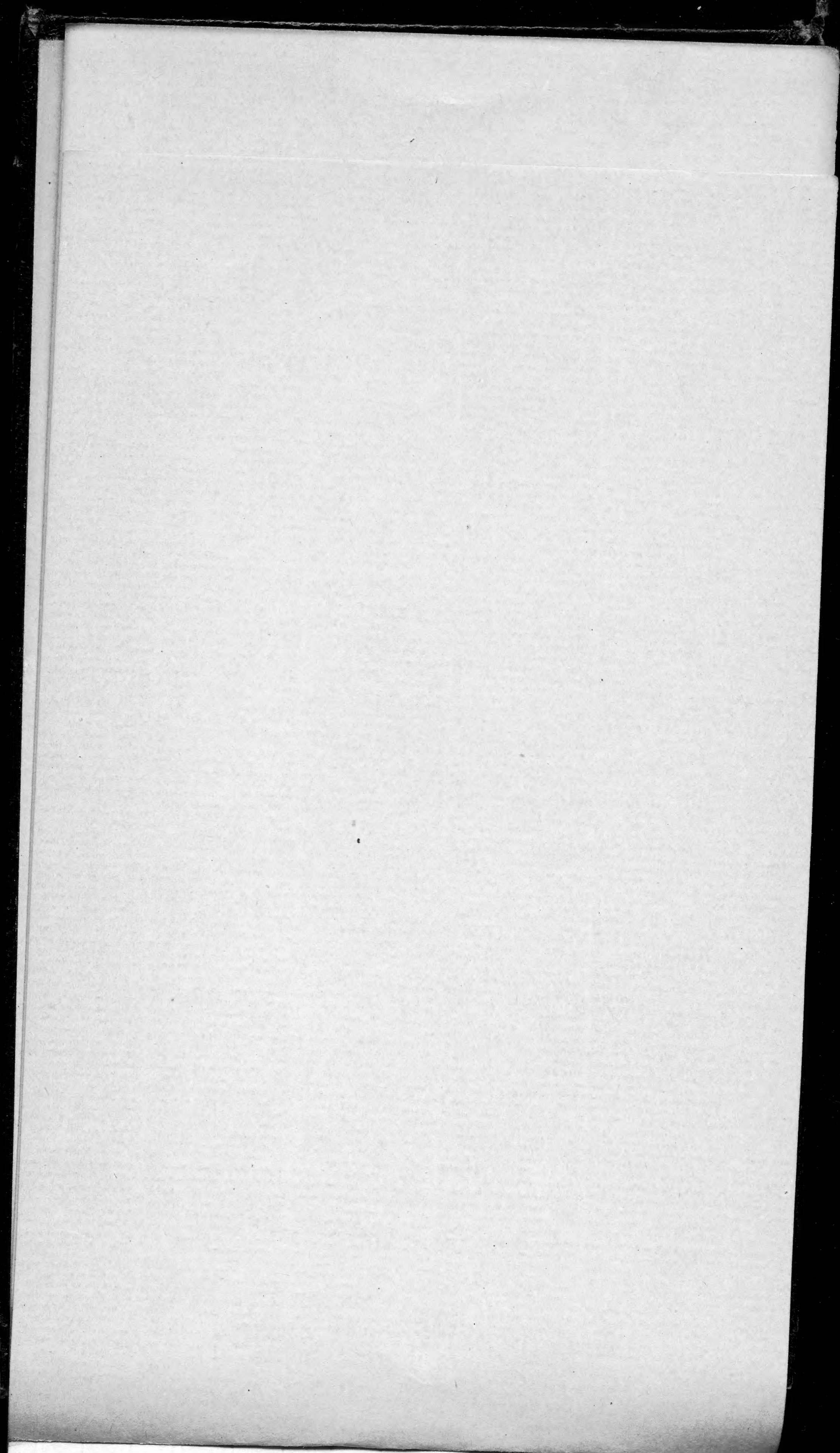
Cal. Valley gravels

Livermore valley

Redding, Cal.

Susanoille.







Smiths Point, Young's Bay.  
 Astoria west of town, east of  
 the high hills on N side of the  
 Columbia bears N.  $50^{\circ}$  W. The  
 N. head at entrance Columbia River  
 bears N.  $78^{\circ}$  W.



a. 8 to 20 feet thick  
 Yellowish clayey sand with irregular  
 mostly rounded stones maculated with  
 peroxide of iron, mostly sand some few  
 clayey with traces of marine fossils, also  
 more or less gravel; not regularly bedded  
 and penetrating into the layer below  
 It dips about  $16^{\circ}$  S and about the  
 same strike to SE by S. Exposure abt.  
 15 ft. vertical at highest. Composed of  
 regular thin layers of chiefly a  
 bluish gray clay with numerous  
 fractures lined with peroxide of  
 iron which develop more now.



merously as the surface dries. The layers contain little sand, some do not show any, but the differences are apparent by the weathering and appear in their sequence to follow with a certain regularity. Here and there a little gravel is mixed in one of the layers and in these gravelly layers are also small fragments of bivalve shells, the most perfect being a small slightly concentrically undulated *Pseudamnisium* less than half an inch long usually. *Acila* was also observed and a small *Waldheimia* like the young of *Lagurus californicus*. Occasionally in the upper layers of this formation the clayey parts have formed concretionary nodules in part fossiliferous. They are arranged in thin layers of a single series of nodules. These contain foraminifera and I saw a fine *Solarium* of small size in one fragment.



also carbonaceous particles  
and fragments of small bi-  
valves chiefly *macoma*.

This disappears under the small  
talus at the foot of the section. The  
beach of the river not far distant  
is composed of the pebbles and small  
boulders of the hard sandstone  
from upper layer (a). There are  
also in this layer rare rounded  
small pebbles of a very hard  
bright pink <sup>minutely</sup> granular rocks whether  
crystalline or sandy schist I did  
not determine.

~~Near~~ ~~For~~gue Pt the same formation was  
recognized, but layer (a) seemed thicker  
and the regularity of the layer (b) was  
much broken up. As far as could  
be determined in the absence of any  
road or path at the foot of the bluff,  
which is fenced off into lots most of  
which are built upon, the formation  
is the same all along the bluff be-  
hind the town which is largely built  
upon piles. The High or Public ~~Blot~~  
building is at about the western third.



of the front and on each side of this the hills rise higher than elsewhere, perhaps 150-200 feet in all. Behind the slopes which have been graded and built upon, there is on the west part of the bluff facing northwardly, a fine section with thirty or forty feet of the <sup>gray</sup> clayey layers (3) exposed at an angle of  $45^{\circ}$ - $60^{\circ}$ , surmounted by as much more of the yellowish alluvial (a) which here and there descends, in dykes, into the clays. The clays dip about  $26^{\circ}$  SSE, but are not invariable and in some places are broken down or show signs of having crept. The alluvial (b) has crept over the clays on many slopes and where cleared away leaves fine examples of slickensides. On Chenamus St. a gradual slipping of a bank of this kind has pushed the plank sidewalk at its base nearly two feet out.



of line. The upper margin  
of the clays is not always well  
marked in the sections being  
sometimes ~~not~~ indistinguish-  
ably merged with the alluvial,  
and similarly colored with  
iron derived from the alluvial

The fossils are beside the *Purpura*  
~~or Fusus~~ a variety of bivalves, *Macoma*  
*acila*, a grooved *Yoldia* like  
*lanceolata*, a smooth one like  
*amygdala*, a truncate one like  
*obesa* (?) A large *Pecten* <sup>(*carriensis*?)</sup> with  
stronger ribs than *caurinus*  
a *mesolia* or *turritella*, slender with  
elevated spirals, two inches or less long.  
a large coarsely grooved *Denta-*  
*lium* (like *Albalus* sp. but less curved  
& more cylindrical) a small *Natica*, a  
*Cytherea*, an *Axiinus*, a large *Lima*

From Shoalwater Bay Mr. White showed  
me siliceous casts of the *Purpura*, the  
*Dentalium*, the *Mesolia*, the *Cytherea*, a  
*Macoma* and *Aturia zigzag*, which  
would suggest a very late Eocene or  
Early Miocene age for these clays.



It should be noted that in the upper part of the clays the fossils, or at least part of the bivalves seem to have been fossilized in a sandstone, washed out and reembedded in the clays, so that between the valves, or on one side of a single one, there will be a <sup>soft</sup> coarse sandstone while the fossil is otherwise entirely embedded in a dark waxy clay.

Longue Pt. itself is a basaltic mass and on top of the ridge behind the town according to Prof. Condon there is a layer or strip of basalt, fragments of which are found on the beaches. About one block west and on the south side of the street from the Union Pacific dock where a fire had burned away the planking of the sidewalk and buildings there is a very large solid block ten or twelve feet square and fifteen feet high probably of basalt though I could not



get at it to test with the hammer.

The original beach at its foot was abundantly strewn with large fragments of the same stone

I looked carefully along so much of the beach as is at present exposed for concretions but found none though formerly there were a good many of them. They were burned for lime in early days, lime being scarce in this region.

and the bed from which they were derived being very low down & near the water's edge has long been covered by planted roads, piles and buildings, so that little erosion has been likely to take place of late years and the supply is probably exhausted by cut off



*Alvinia zigzag* (or *Matthewsoni* Yabb) was found in concretions of the shale washed out on beach at Astoria by Prof. Condon and also at Tillamook (+ Shoalwater Bay, White) heard of it at Bellingham Bay but did not see specimens.

Eocene on Duwamish River 12 mi from Seattle, *Turritella*, small *Cytherea* etc.

- *Rostellites*? Eocene of Astoria (mentioned)  
Miocene Cape Arago & Yaquina Bay.

Pt Arago is Eocene & Rocky Pt 3 mi inland on Coos Bay  
~~for the~~ is Miocene

Big *Scaluria* from near Springfield bridge a few miles from Eugene  
Also from Salem Oregon

*Serosoma*-like shell Cape Arago  
Eocene other from Eugene Miocene

*Rostellites* from Astoria <sup>Eo?</sup> (118) Coos Bay  
& Yaquina Miocene (all?)



North Umpqua River Forks  
Melanopsis like shell, 20 miles  
east of Roseburg near Patterson  
Mills Oregon

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Pompholyx effusa typical from  
the river between the lakes Klaskan  
Carmifex recent one from the  
same place called Link River  
Carmifex fossil from Silver L.  
Lake Co. Oregon.  
Planorbis from Link River

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Quaternary from Lighthouse at  
Cape Blanco Ore. 216 ft above  
the sea; also at Cape Arago, Tillamook  
and Shoalwater Bay where  
they are only 50 feet above the sea  
Prof. Condon. Shells as follows see  
list further on in book



Smith's quarry, East about 1 mile  
from Eugene. In Miocene  
rocks with mytilus Modiola, Mac-  
tha, Solen, Natica, Nerita Purpura +  
Liofus. Rock grayish sand from  
soft to quite hard, weathering yellow-  
ish dipping SE by about  $6^{\circ}$  covered  
by alluvial, upper layers broken  
up, lower ones more massive  
with several lines of specially  
fossiliferous rock crammed  
with crushed fossils mostly  
molds but some retaining their  
lime which has however been re-  
crystallized into spar. Thickness  
of rocks exposed about 37 feet  
but not more than 20 ft in any  
one vertical are visible



Springfield bridge. Three miles E from Eugene. E. side of river beginning just south of new abutment. Strata dip eastward between 5° and 8° the section being a little east of S and W. of N. along the river (Big Sclaria found near this spot) for about a mile; measured thickness of the rocks from the abutment of the new bridge (1890) to the point where they dip below the river and form a bar at low water about 160 feet.

This is an excellent section of the Miocene which is here unconformably overlaid by 5-10 feet river alluvial, the largest gravel just over the edges of the Miocene rocks. Top of hills capped by basalt according to Prof. Condon. The surface under laid by Miocene is gently rolling and has been //



eroded before the deposition  
of the gravels. The Miocene  
rocks appear all around  
the edges of Chathamet valley  
except where they dip into  
deep valleys & are obscured  
by alluvial or where they are  
covered by basalt. They  
overlie the Eocene at Coss  
Bay, where they form the  
landward slope the sea  
ward slope being formed by  
the edges of the Eocene.  
The last schists occur at  
the islets at the mouth of  
the Coquille River above  
this Eocene forms the  
coast to

where it is succeeded by  
the Miocene which persists  
to



Up to Port Orford the coast is composed of schists & the last serpentine hill is at Port Orford. Between Orford & Blanco and at the foot of the latter is a small strip of Miocene. Six or seven miles north at village of Denmark is a stone quarry based on metamorphic rock above which are 4-500 feet of what Prof. C. takes to be Eocene rock but which bears no fossils, a sandstone somewhat altered in the central part of the D fold. Then a low coast to the mouth of the Coquille but inland where the land rises to 500 feet or so, *Cardita planicosta* has been found. Off the S. head of the Coquille are several schistose islets with feldspathic and hornblende crystals. In the sheltered nooks between these is found quaternary about 50 ft above the sea.



North of the Coquille the shore is sandy until Cape Arago is reached - This is Eocene. Going inland at Rocky Pt. about six<sup>4</sup> miles in, the Miocene begins.

Across the entrance there are 20 miles of sand until the mouth of the Umpqua is reached.

Here is another large mass of rocks referred by Prof. C. to the Eocene and supposed to be continuous with the known Eocene of the upper North fork of the Umpqua 20 miles E of Roseburg.

The Miocene appears on the Coast a little south of Yaquina Bay, without any Eocene until Astoria is reached.

Inland at the base of the Coast mts on the Siletz reservation a fine Nautilus of the pompilius type was collected. probably Eocene 14

At Astoria the Eocene forms



ly appeared a bed with  
concretions among which  
Atrina was collected. These  
were washed out on the  
beach & burned for lime  
years ago & the town  
has covered the old  
beach so they are no  
more accessible. In  
Shoalwater Bay it appears  
again. There is a fine  
exposure of quaternary  
at Shoalwater Bay about  
30-40 feet above sea  
at Duwamish 12 miles from  
Seattle there is Eocene  
In the Makah valley  
from Corvallis to Albany  
the river is forced to turn  
to the eastward  
by a fine Eocene mountain  
mass  
Near Sheridan Cardita plani-  
costa has been found. Yamhill  
County.



Shoalwater Bay Pleistocene

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Schizothaerus

Saxidomus squalidus

Wacoma? sp. 1000

Alveolatus Parapomacrus

Memora quitra pata

Tapes staminea

---

Pleocene immediately under  
the above has

Buccinum cyanum

Mytilus with strong divaricate

Crepidula sp. (ribs)

Pecten medium size sharp

ribs rather inflated

Panopaea?

---

Yaguma Pleistocene

---

Zirphaea crispata

Placunanomia macrovalvata

Pholadidea penita Natica leonisi

Saxidomus squalidus

" anatus marginatus

Tapes staminea Parapomacrus



10-10 ft-  
Margarites 8 ft above sea  
quaternary

Bandon quaternary at the  
mouth of the Coquille. (80 ft)  
+ 60

*Saxidomus squalidus*  
*Schizothaerus*  
*Purpura crispata*  
*Purpura reginaensis*  
*Margarita Boucheyana*  
*Mya truncata*  
*Macoma sabulosa*  
*Terebratulina*  
*Saxicava rugosa*  
*Arenaria* like small *Euryngia*  
\* (*Cardium corbis*, Tillamook)  
*Placunanomia macarischima*  
*Margarita papilla*  
*Amphissa corrugata*  
*Orchotropis cancellata*  
\* (*Arenaria nitida*, Tillamook)  
*Ocenebra intafossa*



Cape Blanco quaternary  
200 ft

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Schizothaerus  
Saxidomus squalidus  
Mya truncata  
Lepas staminea  
Macoma inconspicua

---

Warner Lake shell mounds  
covered with shells  
Carenifera angulata  
rounded large  
in or between very large  
angulated at base  
Valvata round smooth large  
Pompholyx  
Hemimicola  
Anceylus  
Pachyma

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15

Crooked River E of Biscuits  
Old Lake Basin near Warner  
Physa - Lake Warner



Union Co E. Oregon  
E. slope of Blue Mts  
near Snake River

Large Vivipara  
Melanian like Goniotus's  
Lithasia?

Near Powder River and the  
Old Emigrant Trail.

Melania  
Vivipara  
Lithania antiqua  
Small form like Billium



## Redding, Cal

The fossiliferous sandstones of Redding seem to be unconformably adjacent to the metamorphic schists of the valley further up. Near Middle Creek the valley which is narrow begins to widen and its floor is formed by the irregular edges of the schists where the floods have laid them bare, above them is the coarse reddish gravel containing many rather large cobblestones. One third of the way, or so, from the Middle Creek Station to Redding the schists come to an end and there is a series of somewhat crumpled strata, the lower of which are sandstones, mostly a good deal tilted, dipping to the S.W. Over these lie (1) a ten or twelve foot stratum of gray sand with enough clay in it to give



the mass stability. This bed is remarkably uniform in texture and free from pebbles or other fragments and showing no trace of fossils. It is on the whole more horizontal than the sandstones and visible over what is exposed half a mile of the section. Over it are the same coarse gravels which cover the schists, but here the gravels seem almost a quite conformable to the sandy bed. The fossils collected were obtained at the first outcrop of sandstone on the railroad cutting west of the track on the way from Redding to Middlebrook. Very few have any of the form of the shells preserved; a *Voluta* like or alio's shell much resembling *Lirapetus* externally rather long, 2 in., and spirally sulcate, showed the most.



Susanville Cal

Mr. Frost found impression  
of radiated bivalve perhaps a  
*Rhynchonella* in a small  
slate pebble in the gravel of  
the head of the valley above  
Stanley Brown's camp near Mr  
Lorip's house.

He also has mass of Tertiary  
shell rock with

*Acila* like *californensis* or *Lyalli*  
*arca*

*Trigonia*!

*Cyrena*?

*Cytherea*

Probably *Chico*.

*Actaeon* etc

from Mineshow road, Butte Co  
20 miles SE of Chico, Cal



Stockton Cal.,  
Jerome Hawes Esq

For many years devoted to boring artesian wells in the valley for water, oil, gas etc. and has probably done far more of this work than any other man in the state.

In boring in the valley away from the vicinity of the foothills the strata everywhere show great uniformity. They consist of clays and sands the beds of clay getting relatively thicker as they descend the beds of sand usually 6-8 feet thick remaining unchanged while the clay will sometimes attain more than 100 feet without a break. The layers are perfectly horizontal or at right angles to the axis of the bore. Gravel is rare. At about 200 feet in Stockton there is a layer of which the pebbles reach the size of cobblestones. This



layer at the well in the Courthouse yard is about 5 feet thick and also at the Hawes gas well, but laterally from a line drawn between these two it diminishes in thickness and runs out to a few feet at the distance of a few blocks from this axis. From this to about 1400 feet there are merely alternating layers of clay and coarse sand. About 1400 feet (Hawes gas well) there is more gravel with round or pebbles usually rather small not exceeding  $2\frac{1}{2}$  inches in diameter, mostly quartz or clay porphyry; usually with a thin black coating of iron oxide but occasionally without it. The greatest depth yet bored is about 2100 feet but no rock was yet encountered at that depth. At 1100 feet the water begins to be somewhat saline, contains magnesia, salts and some borax beside bubbles of



gas and traces of petroleum.  
At 1400 feet there is less salt  
(not very perceptible to the taste)  
but more baux and the water  
has a temperature of 90° or  
thereabouts. Below the gravel  
it becomes more saline again.

It is not potable below  
1100 feet. 20 miles east from  
Stockton at the edge of the foot  
hills at about 200 feet struck  
a layer of waterworn granite  
cobblestones in a volcanic  
matrix, after boring through  
this over 100 feet, came to  
gravel & sand as in the valley  
and got no more rock in  
that boring which was carried  
to over 900 feet.

The gravel is traceable to the Si-  
erras. The sand and clay from  
the Sierra side is different in  
texture and color from that on  
the Coast Range side of the  
valley. But on the latter side  
after boring through about



500 feet of Coast Range detritals the drill comes to Sierrita gravel and thereafter continues in it, showing that the latter underlies the Coast Range detritals. At the southern end of the valley the flows of water are larger, purer and more powerful than in the northern part and the decrease is so gradual that Mr. Holmes thought that the artesian water of the valley proceeds more from the South than from any other direction.

No fossils are found in the valley borings. Once he found a spiral shell when boring near the foothills. Small twigs and particles of wood are occasionally brought up but no large pieces. The harder nodules of the clay sometimes are perforated with holes like the borings of some



animal. These tunnels, scarcely larger than the little finger, are sometimes coated with a limy deposit internally.

At about 1000 or 1100 feet a limy or alkaline layer, quite thin, was sometimes passed through, (specimen). Some pebbles from 1400 feet (specimens) were evidently waterworn and mostly quartz. The water from this depth was a slightly milky tinge until it gives off its gas when it becomes nearly clear and of a pale greenish tint in bulk.

The conclusions from these data are that the valley as an estuary is older than the volcanic conglomerate and than the present elevation of the Coast Range. That deposition first from the Sierras and subsequently also from the Coast Range, has



gone on continuously and without material change of ~~place~~ <sup>place</sup> or tilting of the deposited strata though they may have sunk. That the throwing out of the volcanic conglomerate did not interrupt the general detrital action which may even be said to be going on still. That during this deposition the valley was a fresh water lake or stream which did not sustain marine life, or at all events was not favorable to its existence, and at the same time afforded no suitable conditions for fresh water shells.



## Livermore Valley

Oct 2 - 6/90

The Livermore valley is the largest valley of the Coast Range north of Mt. Hamilton and unlike most of the valleys of this range is well watered, agriculture requiring no irrigation the rainfall about 12 inches.

The entire water also is discharged through Niles Canyon into San Francisco Bay by the so-called Alameda Creek. Within the valley there are a large number of creeks each draining a smaller valley or cañon of its own.

The south easternmost is the Arroyo del Viejo which discharges by a permanent stream into a small rounded valley from which there is a small narrow passage into the Livermore valley proper. Here the



hills are composed of miocene sandstone and gravelly strata. The lower layers near or in the bed of the creek are composed of river pebbles mixed with worn and broken miocene shells, oysters, Venus, Tapes, and other bivalves with an occasional Gastropod crushed together with many small quartzite pebbles worn smooth. The rock is very hard and the material clearly the compacted result of the beachworn marine fragments and the gravel of streams, the layers a good deal twisted but the stratum composed of them conformable with those above. The dip is entirely variable but on the whole the strata dip eastward from a few to nearly 30 degrees. A mile or two up the canon



we come upon a mass of much crushed and contorted schists, cut every where by quartz and Jasper veins of various sizes. These quartz veins furnish the pebbles found in the later sandstone and clayey layers, together with cobbles composed of the harder parts of the schistose rock. The sandstones lie unconformably against and over the schist, somewhat as at Redding. The lower layers as described are full of worn fragments of shells but none in their natural shape, condition or position. The upper layers vary in composition, but are more largely sandy, and with numerous sandy concretions surrounded with thin layers of iron oxide, and here and there vegetable remains but



very few quartzite pebbles and practically destitute of fossils. The layers are of various thickness and succeed one another with something like regularity. The upper layers are frequently pale greenish or whitish where weathered, or a little more blue internally. They weather easily and fragments exposed to the air gradually break up into loose sand. Here and there are clayey layers or lenticular masses which intercept the infiltrated iron and are often much hardened by it. The uppermost beds as a rule become somewhat more horizontal than those below and above them all, unconformably to their eroded edges is a layer (5-10 ft) of clayey soil full of pebbles of all sizes, up to cobbles, and also



the weathered concretions of the underlying sandstones. The beds of the brooks are full of the gravel and pebbles which were first derived from the schists but which have been utilized more or less in the subsequent strata and may have been washed out from any of them.

The talus at the spurs of the hills ~~is~~ often almost wholly composed of this gravel the finer material having been carried away. The flat part of the valley to the south is largely composed of brown earth belonging to the uppermost bed described mixed with vegetable loam. Further north there is in the valley and on many of the foothills a very deep layer of the so-called "black adobe" a black clayey



loam which is very soft and in wet weather forms an almost impassable mire and in dry weather shrinks and cracks in all directions.

The miocene sandstones of which the hills are chiefly made up attain a thickness of several hundred feet without any duplication being counted in.

The Tassajara Creek flows westward from the flanks of Mt. Diablo and with its tributaries about ten or twelve miles northward from Livermore. This creek was followed for eight or nine miles up to its headwaters in the hills. It issues by the junction of two brooks from a narrow cañon on the SW flank of Mt. Diablo. Some of the springs which feed it are impregnated with sulphur and



magnesia and give off fumes  
of sulphuretted hydrogen.

Just at the entrance the  
strata are nearly vertical  
the dip being toward Mt. Di-  
ablo and further away from  
the mountain the spur  
which bounds the valley  
to the south is composed of  
strata which dip toward the  
mountain at right angles to  
the axis of the spur from  $95^{\circ}$   
to  $45^{\circ}$  degrees the dip decreasing  
distally. At the entrance of  
the canon to the north the  
strata most prominent are  
of a compacted friable con-  
glomerate of river pebbles  
with very little fine material  
containing occasional resistant  
fossils, such as the heavy shells  
of *Ostrea*. This material varies  
in hardness and weathers into  
fantastic shapes. Further up the  
canon on the right hand side



of the road is a section of  
some of the whitish sandstone  
fine and nonfossiliferous  
(specimen). It weathers yellow  
ish white or pale greenish,  
and appears below in the  
valley at each such as a  
well defined station, at  
intervals. After issuing from  
the cañon, the Tennessean  
flows through a flat alluvial  
bottom, of material de-  
rived from the adjacent hills  
deposited in nearly horizon-  
tal layers and covered to  
a considerable depth (5-10 ft)  
with black or br. Through  
this material are sparsely  
scattered worn fossils, derived  
from the sandstones, mostly  
bivalves.

Somewhere about the headwaters  
of this creek according to Dr. J.  
G. Cooper, some years ago  
Yates found some fossils.



water mark, the shells, according to Stearns, offering some rather remarkable peculiarities. This Cooper supposed to be Pliocene, and my trip involving some 45 miles of driving was undertaken in the hope of rediscovering this bed, but for want of a more specific location we did not succeed in finding the mark which might have been restricted to a small area.

The Teesajara cuts a very deep channel in the alluvial, lying sometimes thirty or more feet below the surface of the alluvial and the banks nearly vertical in many places. Of this bank, ten or more feet may consist of black adobe, though often less and the rest of sandy and gravelly layers, the bed of the creek being sometimes formed by the hardest sand.



stones and in other places  
of alluvial or gravel derived  
from the alluvial,

As the traveller goes north  
the land is more fertile; as  
he goes south from the  
valley toward the schists  
it becomes less and less so  
until it is practically barren.

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Livermore Valley  
Arroyo Mocho

This valley is the next NE from Arroyo del Valle and is separated from it by a high divide. The lower part of it though wider is much like the Arroyo del Valle the rocks being apparently all of the tilted sandstones. About nine miles from Livermore, (the road gradually ascending on or near the crest of the S.W. divide) the summit which is of an extremely soft sandstone or sandy soil which gullies badly where the rain runs off, suddenly exhibits the schists which I had previously observed in a side canon of the del Valle. They are in a much contorted state and above graduate into a shaly rock consisting largely



clayey  
of iron oxide which has been  
mined & ground for paint.

The presence of iron in vary-  
ing degrees makes the schists  
particolored, and from fissures  
in them at about ten miles  
from Livermore issue the  
mineral springs of Agua

Vida, owned by Mr. Allen-  
denhall (circular & analysis)  
and supposed to be useful for  
kidney & rheumatic complaints.

The altitude of the springs is  
1750 feet above the sea.

Above the schists the clayey  
shales have in places decom-  
posed into clay. I observed  
no fossils in them.

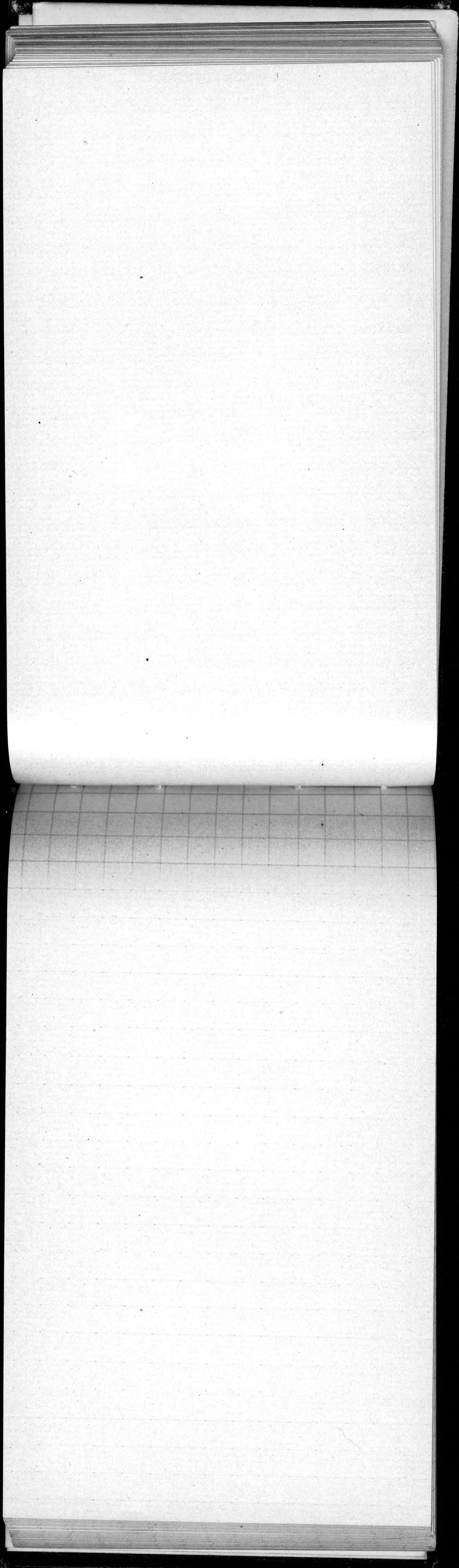
#### Dry cañon

This branch of the Arroyo del  
Valle extends eastward from the  
latter and presents on its NW  
side some interesting effects of  
erosion by rain upon a very  
soft sandy rock with numerous



small gravel stones in it, or  
perhaps one might better  
term it a sandy gravel  
cliff. Of this I hope to get  
photographs through the  
kindness of Mrs. Hammond.







2 undershirts  
2 shirts  
2 draws  
2 socks  
6 hkdps  
3 pr cuffs  
1 collar  
1 - it cover



